

## CalHFA: Green Physical Needs Assessment Statement of Work and Provider Qualifications

### I. OVERVIEW

This document contains a Statement of Work for conducting a Green Physical Needs Assessment (GPNA) for the California Housing Finance Agency (CalHFA) Portfolio Preservation Loan Program. The Green Physical Needs Assessment (GPNA) report has four parts to be completed and delivered as a single report. The GPNA is intended to provide the Owner and the Lender with a complete assessment of a property's condition, necessary and anticipated repairs and replacements, expected operating costs, and potential savings through energy and water efficiency measures. The GPNA should also advise on potential improvements to indoor air quality, use of sustainable materials and the integration of recycling programs into the facility.

The production of a GPNA requires a wide range of skill sets and knowledge bases; typically requiring a team effort. The GPNA Provider (Provider) may complete any of the components for which it has the necessary qualifications; sections of the report or property analysis outside the area of the GPNA provider's expertise may be included by reference within the report, utilizing building professionals who have the necessary qualifications. The Provider must integrate and incorporate all four components of the report into the GPNA.

**Part 1: PNA Report Comparing Traditional and Green Requirements** – The GPNA identifies repairs necessary in the first year following restructuring and the repairs and replacements needed during the term of the loan plus two years, as in a traditional PNA. Part 1 expands from a standard PNA to audit and analyze buildings and their green related resource (energy, water, materials, etc.) data, and the resultant benefits (economic, health, time, convenience, effectiveness or other) of the green characteristics. Part 1 identifies the green measures for repairs and replacements and additional opportunities for improvements that reduce the risks and volatility of energy, water, and maintenance costs, representing the green requirements. This Part provides comments for the Owner on the benefits (financial and otherwise) of using the green alternative for the required repairs and replacements and other property improvement opportunities.

**Part 2: Energy Audit** – Part 2 of the GPNA documents prudent utility-related improvements (water and energy) to the property, the cost of the improvements, and a simple financial payback analysis (however, note that a more sophisticated analysis is available for systems with multiple components with varying estimated useful lives and where the full lifecycle cost analysis is useful). It includes an initial assessment of potentially viable alternatives for generating electricity, heating water, and heating and cooling the conditioned space at the building. At minimum, it identifies reasonable, cost-effective opportunities for the Owner's consideration that are expected to result in at least a 20% reduction annually in energy consumption from the baseline year.

**Part 3: Integrated Pest Management Plan Inspection** – Part 3 of the GPNA documents the pest condition of the property and reviews the pest management plan, if any, in place at the property. The inspection of the current level of pest infestation may reveal the need for additional repairs and/or site changes that are to be included in the first year rehabilitation needs. It includes an evaluation of existing pest control practices and procedures. This report should be authored by a licensed firm specializing in structural pest control reports and may be included by reference into the GPNA.

#### **Part 4: Recommendations of CalHFA's Asset Management Inspector/Property Management Staff -**

Part 4 of the GPNA documents the advice and recommendations of CalHFA's asset management building inspector assigned to the project. This inspector has typically been involved in the monitoring of portfolio projects for an extensive period of time and will be able to submit a comprehensive list of priorities for the project in conjunction with the Borrower's property management team.

## **II. OBJECTIVES**

### **1. Comprehensive Statement of Work**

This GPNA Statement of Work (SOW) is designed such that its data and analysis is deemed reliable to take on the risk of lending money to the project. In addition to assessing the current condition of the prospective property and needs over time as in a standard Physical Needs Assessment (PNA), this SOW protocol also defines the required criteria for an audit to be used by CalHFA to determine if energy and water conservation measures can be put in place to save enough money to pay for debt service that finances all, or some portion of, the improvements.

- The property evaluator shall inspect the proportion of units that is in keeping with these guidelines:
  - for properties that are 30 units or less in size, 100% of apartments should be inspected.
  - For properties that are between 31-50 units in size, 80% of the apartments should be inspected.
  - For properties that are between 51-75 units in size, 60% of the apartments should be inspected.
  - For properties that are between 76-150 units in size, 40% of the apartments should be inspected.
  - For properties larger than 150 units in size, 20% of the apartments should be inspected.
- The property evaluator shall inspect all exterior areas, common areas, mechanical, plumbing and electrical systems at the project. If areas of a project are not available for inspection or inaccessible (such as a roof system), then the property evaluator should specifically state this in the report, so that these building elements or spaces can be evaluated by others.
- A Physical Needs Assessment that meets the requirements of the "Fannie Mae Physical Needs Assessment Guidelines for the Property Evaluator" is acceptable in form to CalHFA.
- The Green Physical Needs Assessment shall provide a narrative of the Contractor's findings, opinions, recommendations and comments along with photographs documenting and elucidating items noted during the inspection.
- The Green Physical Needs Assessment shall include an Executive Summary, which provides a narrative summary of the recommendations within the report, as well as advice from its author as to the basis for selection of energy efficiency and sustainable building requirements.
- The Green Physical Needs Assessment shall include a summary of the Immediate Physical Needs for the project which should consist of all items requiring repair, correction of life safety items, any items within the Structural Pest Control (dry rot) Report, items within the Asset Management/ Property Management list of required repairs, sustainable building practices and green building items that will be incorporated into the project, and targeted energy efficiency improvements that will be made.
- The Green Physical Needs Assessment shall include a Replacement Reserve Analysis that describes Physical Needs of the project over time including the quantity, unit cost and replacement costs for each item over the term of the loan.
- Conduct a comprehensive analysis that identifies all reasonable opportunities for energy and

water conservation savings, including equipment and system retrofits and replacement and operations and maintenance improvements.

- Gather data from diagnostic field tests and extensive site analysis. This may include visual inspection, building systems testing, spot measurements and short-term energy monitoring.
- Conduct an evaluation of the building's integrity to identify any deficiencies that could result in health and safety hazards to residents, code violations, and/or degradation of building systems that jeopardize the long-term viability of the building over a minimum ten-year horizon.
- Conduct an intensive engineering and economic analysis to produce reliable estimates of the project's energy and financial performance with the high confidence needed for major capital projects.

## **2. Portfolio of Measures with Positive Net Present Value (NPV)**

Identify and quantify specific opportunities for energy savings that, taken together as a portfolio of measures, will provide a positive net present value.

## **3. Performance Improvement Targets**

Identify and quantify specific opportunities to achieve a minimum 20% reduction in whole-building energy use by specifying a portfolio of measures defined by the Title 24 Residential HERS II energy end uses of space heating, space cooling, water heating, fans, pumps, lighting and appliances (including solar pre-heat systems).

As part of the Audit, during the site visit the Provider shall document opportunities to improve the building envelope by:

- Installing weather stripping on all doors or hatches that lead from conditioned to unconditioned space.
- Sealing accessible duct joints with approved mastic or foil tape and insulating to at least R-4.2.
- Installing or repairing dampers doors or other devices to obstruct or block air flow to reduce heat loss through chimneys.
- Repairing or replacing visible envelope leaks, including pipe and conduit cuts, window sashes and glass, caulking around frames, sills and other linear joints.

Because of the cost, technical complexity and limited data to process results from blower door envelope leakage tests, these tests are not required on multifamily properties. Accordingly, prescriptive envelope weatherization measures are not claimed for credit in the energy performance model.

## **4. Comprehensive Energy & Water Efficiency and Green Measures**

- Identify all green measures, in addition to energy efficiency, on-site generation and water efficiency, that improve comfort and indoor air quality, create a safer and quieter home environment for the residents and property management workers, reduce the property's negative impact on the environment, and have a lower incremental cost of implementation if undertaken at the time of other retrofit work.
- See California's GreenPoint Rated Existing Home Multifamily retrofit program for a comprehensive list of Green Measures and Rater Verification protocols.

## **III. Building Type Definitions**

Within this document, multifamily buildings are categorized as follows:

- Low-rise Multifamily: Three or more attached dwelling units with less than four habitable stories.
- High-rise Multifamily: Three or more attached dwelling units with four or more habitable stories.
- Mixed-use Multifamily: Three or more attached dwelling units as well as non-residential spaces within one building envelope.
- Small Multifamily: Three to four attached dwelling units within a building configured as a single-family home (such as a Victorian house converted into multiple apartments), to which single-family protocols are appropriately applied on a case-by case basis.

These categories can be further disaggregated by ownership structure and metering configuration (central vs. individual). Although these subcategories may impact the decision-making process for energy improvements, for the purpose of conducting the Energy Audit, the primary distinction is in the multifamily sub-categories described above and between residential and nonresidential spaces:

• **Residential Spaces:** These specifications are consistent with California Whole Home Performance Report and Rating procedures, which currently apply to low-rise residential buildings including single family and multifamily buildings with fewer than four habitable stories. They are also consistent with audit methods presented in the Building Performance Institute’s “Technical Standards for the Multifamily Building Analyst Professional.”

Dwelling units in high-rise multifamily buildings are treated similarly to low-rise multifamily buildings, as defined by the energy improvement requirements of the GreenPoint Rated Existing Home Multifamily program

• **Nonresidential Spaces:** The ASHRAE Level 2 Energy Survey and Analysis, as specified in “Procedures for Commercial Building Energy Audits” (2004), shall be used for the Energy Audit.

## IV. Reference Standards

These specifications are derived from the following reference standards:

- Title 24 Standards for Residential and Non-residential Buildings (2008)
- HERS II Technical Manual (2008)
- Building Performance Institute, Inc., Technical Standards for Multifamily Building Analysts (2008)
- HUD, Energy Conservation for Housing: A Workbook (1998)
- RESNET, RESNET Standards, Chapter Seven, Comprehensive Home Energy Audit
- ASHRAE, Commercial Building Audit Standards (2004)
- Enterprise San Francisco Bay Area Affordable Multifamily Retrofit Initiative Audit Protocol
- City of Berkeley Money For Energy Efficiency Audit Standard
- GreenPoint Rated Existing Home Multifamily program

## V. Team Qualifications and Responsibilities

### 1. Evaluator Qualifications

The Property Evaluator (or Green PNA Provider) shall have minimum qualifications as specified in the tables below associated with the various tasks included in the property’s rehabilitation work scope. To fulfill the tasks listed in these tables, the Evaluator may assemble multi-disciplinary teams consisting of employees or project partners. The Evaluator shall ensure that its personnel and any contractors assigned

to perform services have the necessary qualifications, licensing, bonding, insurance, competence, skill sets and experience required to fulfill their respective responsibilities.

Task:	Minimum Qualifications
Part 1: Green PNA Report	
Green Physical Needs Assessment	Individual or firm acceptable to CalHFA and regularly engaged in producing Fannie Mae PNAs.
Financial Payback Analysis and RRA	Approved PNA provider
Funding Evaluation – identification of incentives and rebates	Approved PNA provider
Part 2: Energy Audit	
Energy Modeling and Utility Data Analysis	Any of the following: <ul style="list-style-type: none"> <li>California Association of Building Energy Consultants Certified Plans Examiner (CEPE)</li> <li>CA HERS II or RESNET Rater</li> <li>MF BPI BA</li> </ul> HERS II MF supplemental training
Whole Building Energy Audit, Recommendations and Third-Party Verification	Two of the following: <ul style="list-style-type: none"> <li>HERS II Rater (CA Whole-House Home Energy Rater) or RESNET Rater</li> <li>CA Existing Building Multifamily Training</li> <li>BPI MF BA</li> </ul> GreenPoint Rater Existing Home Multifamily Rater
Combustion appliance safety	BPI Building Analyst
Part 3: Integrated Pest Management Plan Inspection	
Integrated Pest Management	Any one of the following: <ul style="list-style-type: none"> <li>Green QualityPro</li> <li>Greenshield</li> <li>Ecowise</li> </ul>
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## 2. Provider Responsibilities

- **Performance:** Complete the work and provide the deliverables as specified in these Audit Specifications.
- **Materials:** Provider will obtain and/or provide any and all equipment required to provide the Audit services, such as computers, cameras, thermal imaging devices, software, data loggers, meters, measuring devices, pressure gauges and blower doors.
- **Methods:** Provider shall comply with all local safety and security requirements and perform all

onsite work in coordination with the designated local point of contact.

- **Provider Conduct Standards:** Residential Providers shall comply with applicable professional standards for ethics as defined by the Building Performance Institute Code of Ethics.

Nonresidential Providers shall comply with the ASHRAE Code of Ethics

([www.ashrae.org/publications/detail/16451](http://www.ashrae.org/publications/detail/16451)).

- **Representation:** An officer or owner of the firm conducting the Audit shall certify in writing that the Audit meets these Audit Specifications without exception, unless specifically exempted, and that the final Audit Report has been reviewed for quality assurance purposes by a principal or officer of the firm.

## VI. Building Owner/Client Responsibilities

The property owner or client is responsible for providing the following, if requested by the Evaluator:

- Available mechanical and electrical as-built drawings
- Available energy management and control system documentation and drawings
- Energy cost and use data or authorization to obtain such data from the utility company (or reasonable efforts to acquire residents' billing data or authorizations), including:
  - Utility service agreement identification numbers for all gas and electric service
  - One year of client's monthly building natural gas and electric utility data
  - One year of client's building 15-minute electric interval data, if applicable
  - Facility access within 48 hours of request from Provider staff for data collection
  - Turnaround time of two working days for response to Provider's inquiries

## VII. Sampling Protocol

All nonresidential spaces shall be audited (including office, retail, community space, common areas, etc.).

For residential spaces, sampling shall be conducted in accordance with Section 8.4.2 of the California Title 24–2008 Residential Compliance Manual, wherein at least one in seven of every unit type (defined as having same/similar floor plan) shall be inspected, with representation from differing building floors and including all four building orientations.

In no case shall the inspection include less than 10% of the total number of residential units. A larger sampling may be necessary depending on special circumstances (see Section II – Objectives above). The Provider shall ensure that a discussion of unit sampling with the owner or owner's representative addresses special building circumstances that may result in an increased level of unit inspections and testing.

If the project is composed of multiple buildings, the whole building-simulation shall include at least one example of each building type.

## VIII. Statement of Work

### Part 1 PNA Report Comparing Traditional and Green Requirements

#### 1. Site Visit

The purpose of the site visit is to collect all necessary information to conduct an appropriate energy, water, health and environmental analysis, including sufficient information to inform an energy model.

The Audit shall include an in-person visit to the project site by a qualified Provider to complete the following tasks:

- A. Preparation, scheduling and tenant notification (through building property management staff)
- B. Interviews of owner, property management staff and CalHFA Asset Management Inspector
- C. Safety and code observations
- D. Visual inspections and diagnostic testing to evaluate the efficiency and condition of the building envelope and systems

#### **A. Site Visit Preparation, Scheduling and Tenant Notification**

- Provider shall complete the site preparation tasks as described in the Energy Budget Field Data Sheet.
- Provider shall review CalHFA's Portfolio Preservation Loan term sheet for the building's eligibility to participate in the program.
- Provider shall review 12 months of prior utility bills (including gas, electric and water) to know annual utility cost by fuel type and seasonal variations.
- Provider shall review as-built drawings (if available) and any other pertinent information about the site, the building and its systems, to be provided by the property owner or owner's representative.
- Provider shall schedule the site visits with the owner's representative and CalHFA staff at a time convenient for all parties attending the site visit. The site visit shall seek to cause minimal disruption to the project's residents and neighbors.
- The property owner shall notify residents whose units will be inspected as part of the Audit. This notification shall be the sole responsibility of property owner or their representative.

#### **B. Project Interviews**

The Provider shall interview the following persons prior to or at the time of the site visit:

- Property Management or Maintenance Staff most familiar with issues at the building(s)
- Owner or Owner's representative
- CalHFA's Asset Management Inspector

The purpose of the interviews is to:

- Discuss the Audit's objectives and the client's goals for the scope of retrofit
- Discuss building characteristics, existing documentation, and project energy and water performance
- Discuss residents' comfort, health and safety and agree on an approach to accessing residents for interview and to view dwelling unit spaces for the site visit. If any interviewee wishes their responses to remain confidential, the Provider shall respect those requests.
- Discuss operations and maintenance procedures, including but not limited to the issues listed in the Energy Budget Field Data Sheet
- Address any other stakeholder questions or concerns

#### **C. Safety and Code Observations**

If, during the course of the site visit, the Provider observes a condition issue that, in his or her judgment, may be a building code violation or a potential threat to health or safety, the Provider shall immediately notify the designated persons in the project application and/or any individuals that are present representing the owner.

#### **D. Visual Inspection and Diagnostic Testing**

The site visit shall involve visual inspections, photo documentation, and diagnostic testing of the building envelope, and HVAC, combustion safety and lighting systems. The Evaluator shall identify and record equipment specifications listed on the Energy Budget Field Data Sheet. The equipment specifications will

be used in the energy modeling and analysis phase of the Audit. All Items listed in Energy Budget Field Data Sheet, as applicable, shall be performed during the site visits.

## **2. Standard PNA Improvements**

- Critical items: Identify in detail, and report immediately to property management and Owner any repair item(s) that represents an immediate threat to health and safety.
- Repair/Rehab items (Short Term Physical Needs): Identify and estimate the cost of the repairs, replacements, and significant deferred and other maintenance items that will need to be addressed within twelve (12) months of closing (do not include items that are not broken but may need replacement in the period beyond the next 12 months).
- Market Comparable Improvements: The Evaluator shall include repairs or improvements that are necessary for marketability in the list of Repair/Rehab needs. The repairs/improvements identified should be those necessary for the project to retain its original market position as an affordable project in a decent, safe and sanitary condition (recognizing any evolution of standards appropriate for such a project). The project should be able to compete in the non-subsidized market on the basis of rents rather than amenities. Where a range of options exists, the least costly options for repair or rehabilitation should be chosen, when capital, operating, and maintenance costs are taken into consideration.
- Long-term Physical Needs/ Reserve Items: Identify and provide an estimate of the major maintenance and replacement items that are required to maintain the project's physical integrity for the term of the loan. The items evaluated (both recommended and not recommended) are explained in the narrative report and the recommended items are documented in a table in the report. The Provider should identify cost-effective opportunities to replace/upgrade systems that have a useful life longer than the term of the loan.

## **3. Mandatory Testing Requirements**

The Energy Audit requires standard building performance testing such as a combustion appliance safety test and duct leakage test, described in more detail below.

### **Combustion Appliance Safety Test**

A Combustion Appliance Safety Test shall be conducted by a certified Building Performance Institute (BPI) Analyst using the BPI Standard Testing Practices in all inspected apartment units. Deficiencies shall be reported to the owner or owner's representative for any system that fails this test. The owner will be responsible to arrange for corrections any system that fails the test, and to install a carbon monoxide detector in 100% of dwelling units containing a combustion appliance in each building regardless of test results. If there are no combustion appliances in the dwelling units and it is determined that the testing is unnecessary, a statement confirming this fact should be included in the report.

### **Duct Leakage Test**

Duct leakage tests shall be conducted for all systems that have more than 12 feet of supply or return air ducts in unconditioned space. For purposes of the duct test requirements, ducts located in the space between two conditioned floors shall be considered to be within conditioned space. Ducted system leakage must be corrected per the Title 24 protocols and leakage targets for existing buildings, additions and alterations.

## **4. Recommended Energy Efficiency**



At a minimum, in evaluating recommended energy and water efficiency improvements, the GPNA Provider describes, compares and comments on:

- Domestic Hot Water (DHW) – age, size and rated efficiency of units, insulation, temperature setting and set-backs, appropriate efficiency and size for replacement units;
- Heating Ventilation and Air Conditioning (HVAC) – age, size and rated efficiency of units, age and type of thermostat;
- Wall, ceiling and basement (if applicable) insulation – describe the existing insulation and cite the difference between this and local code for new construction;
- Refrigerators – age, size, rated efficiency of units, potential replacements;
- Dishwashers (where they currently exist) – efficiency standard, age, replacement options;
- Water Conservation – flow rate of shower and faucets, hot water temp at tap, hot water pipe insulation, toilet tank size;
- Ventilation – kitchen and bath ventilation (recirculating or outside), appropriate size for replacement units;
- Lighting –
  - o Apartment lighting – existing lighting methods, over-lighted conditions, conversion to CFL bulbs or fixtures;
  - o Lobby, common area, corridor – exterior doors (see above), existing lighting methods, lighting (sufficiency/excess, conversion to CFL bulbs and/or fixtures, T-8 (or smaller) electronic ballast fluorescent, LED exit light and automatic control potential);
  - o Exterior lighting (including parking area) – existing number, type, sufficiency/ excess illumination levels and efficiency of lighting type, conversion potential to more efficient lighting type, automatic controls;
- Central Plant Boilers/Hot water -efficiency, age, potential for combined heat and power (CHP), set backs;

## **5. Additional Water and Green Building Measures**

An objective of the GPNA is to identify opportunities to improve energy efficiency, maximize water efficiency, use re-used and recycled materials where practical, safeguard the indoor air quality of the property, be of less harm to the environment generally, and remove, re-use or recycle replaced materials and construction debris as appropriate.

The Provider is required to evaluate all components in the building, all building systems, and all components on the property, and the property itself, to identify opportunities to achieve the stated objective. The Provider is expected to consider the cost-effective, market accepted and proven improvements that are expected to reduce energy and water consumption by at least 20% annually from the baseline, to identify two alternatives to be considered by the Owner, to provide a justification for the green alternatives recommended and a brief explanation of why the non-recommended alternatives are less appropriate for the subject property.

Each line item must identify the:

- A. costs of the traditional repair/replacement to meet the local building code, as applicable, and the alternative using green building principles;
- B. cost estimate for both the traditional and green approaches;
- C. grants, credits, rebates, and other funding that may be available offered by utilities, local/state/national initiatives and non-profits;
- D. expected benefits of the green alternative, both financial and non-financial; and

E. (for the HVAC system, roof, windows, insulation, appliances, and hot water heaters only) whether the recommended green improvement is required by the local building code for new construction, and if so, whether it meets or exceeds it.

### **Operations & Maintenance**

Identify operations and maintenance opportunities, including demonstrated potential to achieve quantifiable electricity or gas (kWh, kW or therm) savings.

This includes activities such as building commissioning, retro-commissioning, building automation systems, central water heating tune-ups and controls, operations and maintenance procedural changes, producing an operations and maintenance manual and related management training.

Identify opportunities to increase durability of the building, thereby reducing maintenance requirements and possibly maintenance reserve requirements. This includes selection of more durable building products such as natural linoleum for floors, 40-year or 100-year roofing, and durable non-combustible siding.

### **Water Efficiency, Resource Conservation and Indoor Air Quality**

Identify opportunities for non-energy utility cost savings, including permanently installed water efficiency measures such as high efficiency toilets, landscaping and irrigation improvements, and recycling facility upgrades.

Identify opportunities for non-permanent resident upgrades such as low-flow showerheads and faucet aerators.

Identify additional resource conservation and indoor air quality opportunities that might not have a financial payback but that will have a lower incremental cost if undertaken at the time of retrofit and that will provide comfort and environmental benefits to residents.

### **On-site Energy Generation**

Identify opportunities for onsite energy generation, including:

- a) photovoltaic arrays,
- b) solar thermal for hot water heating,
- c) small wind turbines,
- d) Combined heat and power
- e) Geothermal heat pumps
- f) Other alternative energy technology.

## **Part 2 Energy Audit**

### **Energy Modeling**

An energy model shall be completed using California Title 24 ACM-approved software to document the building's existing conditions and post-retrofit expected conditions. The model shall be based on building plans, initial inspection data and diagnostic data collected during the on-site visits. The energy model is used to estimate annual energy consumption and energy cost savings of potential energy conservation measures.

The procedures and regulations for modeling homes are established by the California Residential Energy Standards, ACM, HERS II Technical Manual and specific guidance from the software vendors.

- Low-rise residential buildings: The Title 24 ACM-approved software shall include CA HERS II calculations through a California approved HERS Providers.
- High-rise residential buildings: The software shall use a HERS II methodology as per the methods prescribed by the GreenPoint Rated Existing Home Multifamily module in the CA ACM-approved software EnergyPro.

The Provider must use any energy modeling software required by the project's local weatherization or other subsidy program (e.g., Treat or EA-Quip) in addition to Title 24 ACM-approved software.

### **Methods and Assumptions**

All major assumptions used to develop the energy model and analysis must be clearly stated in the Audit Report. Reporting emphasis shall be placed on the assumptions that have the most impact on estimated energy savings.

Occasionally, some building features may be difficult to physically verify, such as the insulation in crawl spaces. When certain building features cannot be physically verified, the values from Table R3-50, Default Assumptions for Existing Buildings, in the 2008 Title 24 Alternative Calculation Method shall be used as the default conditions in the energy model and analysis.

Any savings accruing from air sealing measures shall not be applied unless it can be demonstrated that the infiltration reduction is between conditioned and unconditioned space.

Current operating schedules verified on-site are to be used for energy and energy cost savings estimates.

### **Ordering of Energy Efficiency Measures**

The loading order of energy efficiency measures in the energy modeling analysis shall be structured so that improvements to the building envelope and interior lighting are modeled prior to improvements to the HVAC system.

The intent of this loading order requirement is to capture all of the potential effects of envelope and lighting energy efficiency measures on cooling and heating loads and subsequent investigation into impact of energy efficiency measures pertaining to HVAC equipment.

### **Utility Rates**

The project shall be modeled using the current local utility rate schedules as verified during the review of the utility bills. The local utility rate may have to be created in the energy modeling software using the HERS II custom approach. Energy cost savings calculated outside of the modeling software shall be based on actual energy bills or average utility rates obtained from the Energy Information Agency.

### **Model Calibration**

The energy model for buildings that are master-metered shall be calibrated to actual utility billing data. Modeled baseline energy consumption shall be calibrated to monthly utility bills for a minimum of 12 months. The intent is to establish the modeling results verified for consistency and accuracy.

The energy model estimates of electricity and natural gas should calibrate to actual monthly consumption to within 10%. TMY 30 year average weather data can be used in lieu of actual year weather, which may be difficult to obtain.

Any adjustments made to the building description inputs used to calibrate the simulated building to actual energy usage shall be justified with explicit, transparent information and documented in this section of the Audit Report.

### **Exceptional Calculations**

Energy conservation measures not directly modeled with the energy modeling software can be calculated outside of the software provided that generally accepted engineering calculations and methodologies are used. Interactive effects must be accounted for in exceptional calculations. The methodologies, assumptions and constants used in the exceptional calculations must be clearly documented in the final report. Sources of deemed savings must be referenced.

### **Sampling for Energy Analysis**

If the project is comprised of multiple buildings, the whole building simulation shall include at least one example of each building type.

### **Utility Bill Analysis**

Utility bill analysis can offer information on building energy efficiency and occupant behavior. Analysis must include base load evaluation, seasonal evaluation, and recommendations for energy usage reduction.

Acquire one or two years of utility bills and analyze use the patterns. Use the Energy Budget Field Data Sheet to input utility bill information and provide a summary report or assessment to the property owner that discusses baseline loads and recommendations for reduction of utility bills and improvement of comfort.

### **Financial/Payback Analysis**

Provide financial analyses for a portfolio of measures that yields a positive net present value (NPV) in the format of the financial analysis table.

Prepare cash flow analyses that provide a calculated NPV and internal rate of return using the following default assumptions: 5% discount rate, 4% electricity rate escalator, and 3% natural gas cost escalator. Clearly state all assumptions including water rates, life of the measure, incremental costs, interactive effects, etc. Include as credits any applicable rebates, tax credits, grants and loans.

### **Benchmarking**

Register the project in the U.S. EPA's Portfolio Manager tool. For multifamily properties, upload energy billing data as applicable and check with the Utility regarding the status of an Automated Benchmarking Service (ABS) that allows utility data to be directly uploaded.

## **Part 3 Structural Pest Control Report**

A structural pest control report shall be produced by a licensed pest control and incorporated by reference into the Green PNA. All findings within the structural pest control report shall be integrated into the Immediate Physical Needs for the project. If evidence of pests is found to exist, an Integrated Pest Control Report shall be required.

## IX. AUDIT REPORT

For each facility, submit a sufficiently detailed yet succinct report that addresses the scope of the Audit. The Audit Report shall be presented to the Property Owner (client) and Lender (CalHFA) in a face-to-face meeting. The Audit Report shall include the following sections and content:

### **Section 1: Executive Summary**

Summarize the major findings of the Audit, including:

- Basic building characteristics such as number of units, building construction type, number of stories, year built, total building area identified by use (residential, community/common, commercial), history of previous retrofits or rehabs, and other significant building features.
- Date of site visit.
- Names of individuals interviewed.
- Overall physical condition of the building (good, fair or poor with respect to structural integrity, maintenance and repair).
- Recommended energy efficiency and water conservation measures.
- Recommended green measures and other capital improvements needed to ensure the building's long-term integrity.
- Estimate of the cost to install each recommended measure (installation cost shall include prevailing wages).
- Projected savings from implementing each energy efficiency and water conservation measure both in dollars and kWh and therms.
- Comparison of total projected savings to existing energy use/cost.
- Savings to Investment Ratio of each measure.
- Projected carbon footprint reduction.

### **Section 2: Narrative**

Include a written narrative that describes existing property conditions in the following categories:

- Site
- Building envelope including roof and windows, air flow, insulation and ducts
- Building mechanical and electrical systems, including (when applicable) heating, ventilation, cooling and electrical systems, and elevators
- Mechanical room, including (when applicable) boilers, domestic hot water systems, and plumbing systems
- Common areas including community rooms, kitchens, lobbies, corridors, and commercial spaces
- Dwelling units, as relates to: health and safety, energy efficiency and water conservation

Include information from the site visit to verify the building drawings. If the site conditions do not match design conditions, use the site conditions for analysis and reporting. Include information on equipment specifications in accordance with the Energy Budget Field Data Sheet.

### **Section 3: Photo Documentation**

Include photo documentation of the property, specifically targeted toward portraying the relevant physical conditions and energy efficiency and water conservation measures.

## **Section 4: Description of Energy Efficiency, Water Conservation, Green and Capital Improvement Recommendations**

Provide information on each recommended measure and improvement, including but not limited to:

- Description of measures and recommended loading order
- Rationale for recommendation
- Estimated useful life of existing component
- Recommendation for timing of implementing the measure/replacement/improvement
- Identification of how cost estimate was derived (including source of cost information, unit pricing, take-off used)
- If renewable energy systems are not recommended, explain why not
- Non-energy related benefits of the recommended measures such as health and safety, improved indoor air quality, and increased resident comfort

Present this information as an Optimal Green Improvement Plan that includes the most cost-effective combination of recommended measures and improvements, factoring in loading order, available funding, estimated useful life of existing equipment/systems and property owner goals.

Include the results of the diagnostic testing conducted on-site and describe how the test results informed the rationale for the above recommendations. Providers may also offer recommendations for the retro-commissioning of certain existing equipment based on diagnostic test results.

Also include a summary of the combustion analysis testing completed during the energy audit. For all audited dwelling units, include the results of combustion safety testing and identify if action was warranted as a result. Report recommendations shall include carbon monoxide detectors if they are not already installed in dwelling units.

## **Section 5: Energy and Water Audit and Analysis**

### **a. Energy and Water Analysis Methodology**

Summarize the modeling approach and other calculation methods used in the energy and water analysis. Include the name and version of the energy modeling software used and indicate if exceptional calculations were used to estimate energy and energy cost savings. Provide a summary of the approach, and detailed calculations, used in any exceptional calculations used for analysis.

### **b. Utility Analysis and End Use Breakdown**

Describe the applicable end uses for each type of fuel at the project and show a breakdown of the annual energy usage and energy cost by fuel type. The Provider shall:

- Graph energy usage for each fuel type for a minimum of 12 months.
- Review the utility rate structure to determine if it seems appropriate for the project.
- Make a recommendation for further investigation if the Provider finds that the rate structure does not match the utility data.

### **c. Source of Information**

Briefly describe all sources of information used to inform the analysis including:

- Source and scope of utility billing data supplied to the Provider including the data source, the duration in months that the data covers, and whether the Provider received copies of the actual utility bills or electronic interval data.

- Construction cost information used in economic analysis.
- Whether building plans or site verified data were used in the analysis.
- Any discrepancies between plans and verified conditions.
- Utility rate and schedules.
- Source of deemed energy savings.

#### **d. Energy Model Inputs and Assumptions**

State any assumptions used when analyzing energy and water utility data. Reference the Energy Budget Field Data Sheet as well as the building simulation program input file.

#### **e. Energy Model Documentation**

Provide final energy model input and output files used to report energy and energy cost. A log of all final justified adjustments made to the energy model during the calibration process shall also be submitted in the Audit Report.

### **Section 6: Energy Efficiency and Water Conservation Cost/Benefit Analyses**

Include the individual cost/benefit worksheets for each recommended energy efficiency and water conservation measure. The worksheets shall show implementation cost, energy and water consumption and financial savings, simple payback, and incremental payback (as applicable).

### **Section 7: Pest Management Report**

This section of the report will:

- Document the existing pest control strategies, practices, and outcomes.
- Evaluate the existing pest control strategies and practices.
- Identify the deficiencies in the existing pest control strategies and practices.
- Recommend practices consistent with IPM principles that will achieve better outcomes.

In addition, the report:

- a) Identifies any pest infestations as a result of glue trap findings, a visual survey, a review of any pertinent documentation related to past infestations and pest control measures, or interviews with the property owner, management staff, and tenants.
- b) Includes color photographs and a detailed narrative describing the property's pest infestation, if any, and provide a corrective course of action for each infestation, and if needed, specific actions for serious infestations within individual units.
- c) Includes a Glue Trap Summary which identifies in detail the quantity and variety of pest trapped, and any obvious general areas/floors/structures with significant infestations (e.g., if a cluster of adjacent apartments appear to have a more severe infestation when compared to the overall building). Identify groups of infested units as High, Moderate, or Low infestation and detail corrective measures for each.
- d) Details an immediate course of action, being specific as to physical items needed (e.g., door sweeps) and treatments needed, if any, and estimated costs to address the pest infestations for each identified group (see prior paragraph) and a continuing course of action for using IPM principles at the property.

### **Section 8: Qualifications and Certifications**

Include a description of the qualifications and professional certification of any person who worked on the Audit.

### **Section 9: Representation**

Include a representation from an officer or owner of the firm conducting the Audit that the Audit meets the GPNA requirements of the CalHFA Portfolio Preservation Loan Program without exception and that the final GPNA Report has been reviewed for quality assurance purposes by a principal or officer of the firm.

**Section 10: Appendices (color photographs, site plans, maps, etc.).**